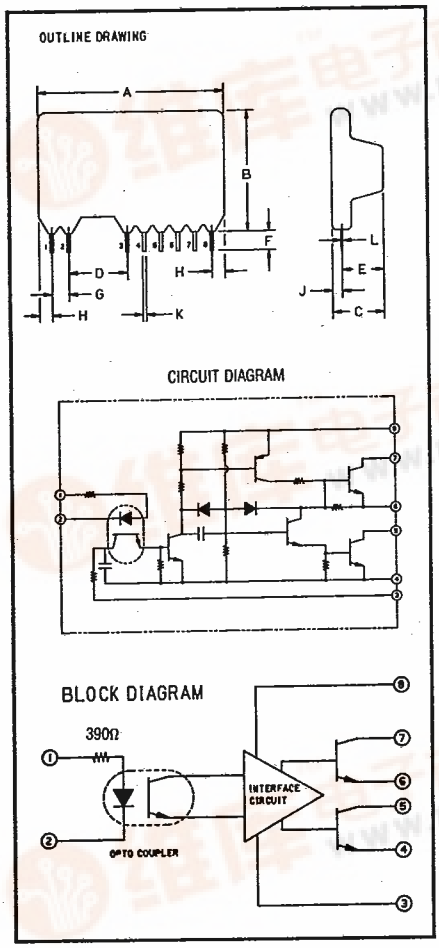
T-41-89

# M57215L
# M57215BL

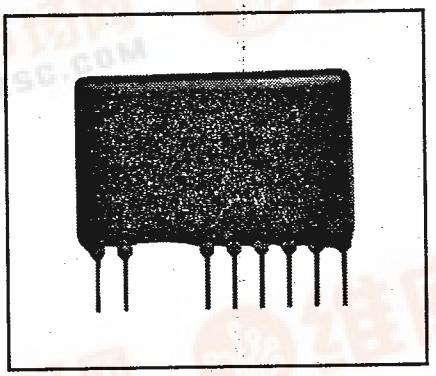
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

## Hybrid IC
## Base Drive Modules
### 2 Amperes/ –3, +10 Volts




**–3, +10 Volt M57215L, M57215BL Outline Drawing**

| Dimension | Inches | Millimeters |
|---|---|---|
| A | 1.142 Max. | 29 Max. |
| B | .748 Max. | 19 Max. |
| C | .315 Max. | 8 Max. |
| D | .300 ± .004 | 7.62 ± 0.1 |
| E | .295 Max. | 7.5 Max. |
| F | .118 Min. | 3 Min. |
| G | .100 ± .004 | 2.54 ± 0.1 |
| H | .079 Max. | 2 Max. |
| J | .059 Max. | 1.5 Max. |
| K | .020 ± .004 | 0.5 ± 0.1 |
| L | .010 ± .004 | 0.25 ± 0.1 |



**M57215L**
**M57215BL**
**Hybrid IC**
**Base Drive Modules**
2 Amperes/ – 3, + 10 Volts

**Description**
Powerex Hybrid IC's are designed to provide logic compatible drive for transistor modules. The module includes an integral optoisolator for electrical isolation between input and output.

**Features:**
- ☐ Small, Lightweight
- ☐ Low Power Consumption
- ☐ TTL Logic Compatible
- ☐ Input/Output Electrically Isolated
- ☐ Single In Line Package

**Applications:**
- ☐ Transistor Base Drive
- ☐ Inverter Circuits

**Ordering Information**
Example: Select the complete seven or eight digit part number you desire from the table - i.e. M57215BL is a 2500 Volt dielectric drive module suitable for driving 1000 volt transistor modules rated at 15 to 75 Amperes.

| Type | Package | Optoisolator |
|---|---|---|
| M57215BL | 8-pin SIL | Yes |
| M57215L | 8-pin SIL | Yes |

*Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272*

***M57215L***
***M57215BL***
***Hybrid IC Base Drive Modules***
*2 Amperes/ −3, +10 Volts*

## Maximum Ratings $T_a$ = −20°C to 70°C unless otherwise specified

| | Symbol | M57215L/M57215BL | Units |
|---|---|---|---|
| Operating Temperature Substrate | $T_S$ | −25 to 100 | °C |
| Operating Temperature Ambient | $T_A$ | −20 to 70 | °C |
| Supply Voltage | $V_{CC}$ | 14 | Volts |
| | $V_{EE}$ | −5 | Volts |
| Input Voltage | $V_I$ | −1 to 5 | Volts |
| "H" Output Current | $I_{OH}$ | 1 | Amperes |
| "L" Output Peak Current* | $I_{OLP}$ | −3 | Amperes |
| V Isolation | $V_{RMS}$ | 2000/2500 | Volts |

*Pulse Width 10μs, f=2kHz

## Electrical Characteristics $T_a$ =25°C, $V_{CC}$ =10V, $V_{EE}$ = −3V unless otherwise specified

| Characteristics | Symbol | Test Conditions | M57215L/M57215BL Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| "H" Input Current | $I_{IH}$ | $V_I$ =5V | — | 10 | — | mA |
| "H" Output Current | $I_{OH}$ | $V_O$ =1.6V, $R_{ext}$ =9Ω | — | 0.9 | — | A |
| "L" Output Peak Current | $I_{OLP}$ | $R_2$=1Ω, $C_{ext}$ =10μf | — | −2 | — | A |
| "L" - "H" Propagation Delay | $t_{PLH}$ | $T_S$ =100°C, $V_{in}$ =0→4V | — | — | 10 | μs |
| "L" - "H" Rise Time | $t_r$ | $T_S$ =100°C, $V_{in}$ =0→4V | — | — | 1 | μs |
| "H" - "L" Propagation Delay | $t_{PHL}$ | $T_S$ =100°C, $V_{in}$ =5→0V | — | — | 15 | μs |
| "H" - "L" Fall Time | $t_f$ | $T_S$ =100°C, $V_{in}$ =5→0V | — | — | 3 | μs |
| Internal Power Dissipation | $P_D$ | $I_{OH}$ =0.9A, $I_{OLP}$ = −2A f=2kHz, Duty=50% | — | 0.33 | — | W |

## Recommended Operating Conditions (Refer to Typical Application Circuit)

| Symbol | KD7245A1, KD724502 | | | KD224503 | | | KD224505 | | | KD224575 | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $V_{CC}$ | 9 | 10 | 11 | 9 | 10 | 11 | 9 | 10 | 11 | 9 | 10 | 11 | V |
| $V_{EE}$ | − 2.5 | − 3 | −4 | − 2.5 | − 3 | − 4 | −2.5 | − 3 | − 4 | −2.5 | − 3 | − 4 | V |
| $V_{IH}$ | 4 | — | 5 | 4 | — | 5 | 4 | — | 5 | 4 | — | 5 | V |
| $V_{OH}$ | 1.4 | 1.6 | 2.1 | 1.4 | 1.6 | 2.1 | 1.4 | 1.6 | 2.1 | 1.4 | 1.6 | 2.1 | V |
| $V_{OL}$ | − 2 | — | — | − 2 | — | — | −2 | — | — | −2 | — | — | V |
| $R_{ext}$ | — | 27 | — | — | 20 | — | — | 12 | — | — | 9 | — | Ω |
| $R_1$ | — | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | Ω |
| $R_2$ | — | 3.3 | — | — | 2.2 | — | — | 1 | — | — | 1 | — | Ω |
| $D_Z$ | — | 1N4372A | — | — | 1N4372A | — | — | 1N4372A | — | — | 1N4372A | — | — |
| $C_{ext}$* | — | 10 | — | — | 22 | — | — | 22 | — | — | 47 | — | μF |
| $C_1$ | — | 2200 | — | — | 3300 | — | — | 4700 | — | — | 4700 | — | μF |
| $C_2$ | — | 470 | — | — | 470 | — | — | 470 | — | — | 470 | — | μF |
| f | — | 2 | — | — | 2 | — | — | 2 | — | — | 2 | — | kHz |

NOTES 1. When using KD___1K___, use M57215BL and set at the above conditions.

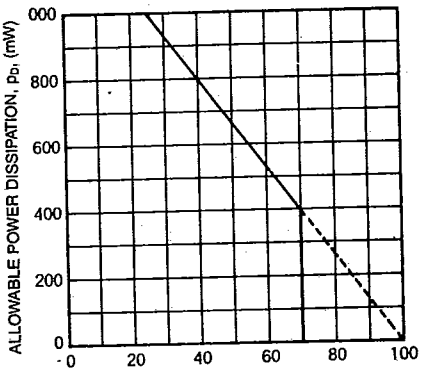
2. When using transistor modules at 100A and above, (i.e. KD324510, KD324515, KS324520 etc.), also use Drive Module KS031K01.

* The equivalent series resistance ESR of this capacitor decreases the sink current $I_{OLP}$, especially at low temperature. A low ESR capacitor is recommended for $C_{ext}$.

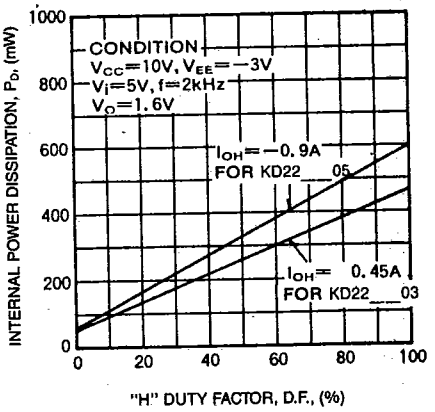
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

**M57215L**
**M57215BL**
**Hybrid IC Base Drive Modules**
*2 Amperes/ −3, +10 Volts*

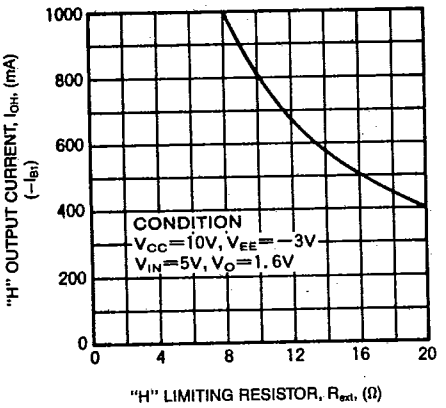
ALLOWABLE POWER DISSIPATION VS. $T_A$ MAXIMUM RATING



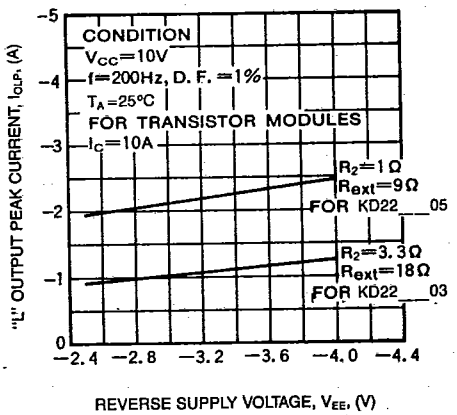

INTERNAL POWER DISSIPATION VS. DUTY FACTOR (TYPICAL)



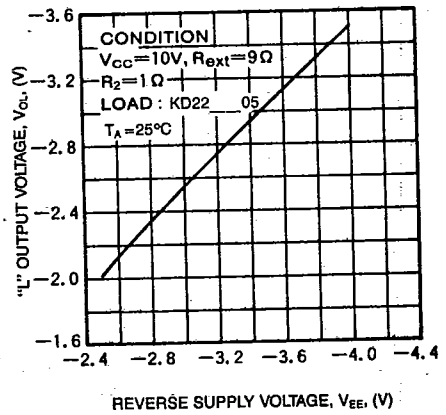

$I_{OH}$ VS. $R_{ext}$ (TYPICAL)



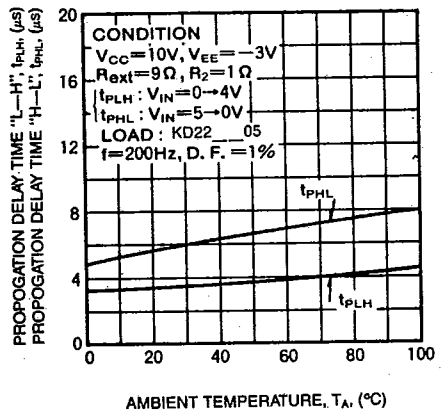

$I_{OLP}$ VS. $V_{EE}$ (TYPICAL)



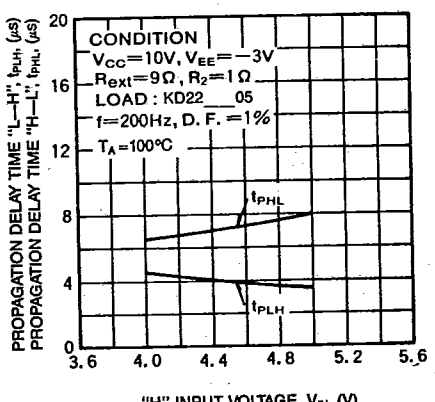

$V_{OL}$ VS. $V_{EE}$ (TYPICAL)



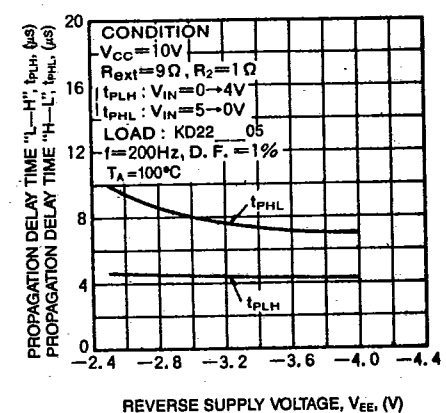

$t_{PLH}$, $t_{PHL}$ VS. $T_A$ (TYPICAL)



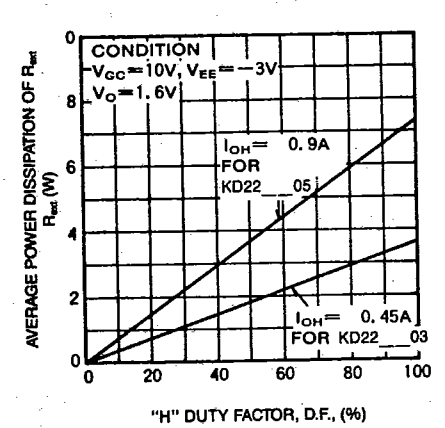

$t_{PLH}$, $t_{PHL}$ VS. $V_{IH}$ (TYPICAL)




$t_{PLH}$, $t_{PHL}$ VS. $V_{EE}$ (TYPICAL)




POWER DISSIPATION OF $R_{ext}$ VS. DUTY FACTOR (TYPICAL)

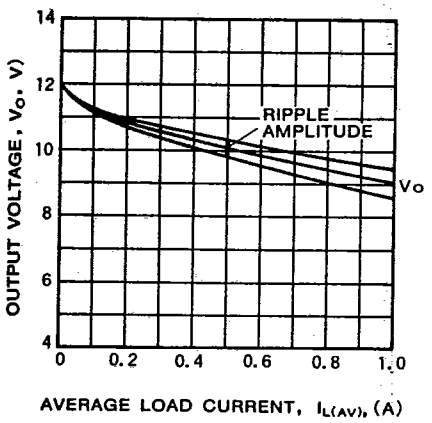


POWEREX

Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

**M57215L**
**M57215BL**
***Hybrid IC Base Drive Modules***
*2 Amperes/ −3, +10 Volts*

**OUTPUT CHARACTERISTIC OF FULL WAVE RECTIFYING CIRCUIT WITH CENTER-TAPPED TRANSFORMER (FOR REFERENCE)**




**Explanation of Function**

1. With low input level, ($V_{in}$ = 0 ~ 1V)
   Tr1..OFF, Tr2...ON
   The base terminal of the transistor module is reverse biased with respect to its emitter by reverse power supply $V_{EE}$.

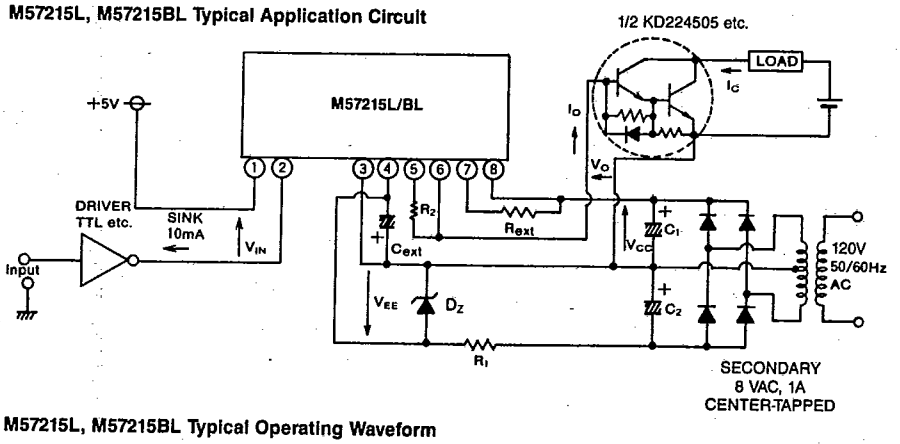
2. With high input level, ($V_{in}$ = 4 ~ 5V)
   Tr1...ON, Tr2...OFF
   The base terminal of the transistor module is forward biased and driven by the current $I_{OH}$ through the resistor $R_{ext}$.

3. With low input level, ($V_{in}$ = 0 ~ 1V)
   Tr1...OFF, Tr2...On
   The base terminal of transistor module is reverse biased as stated in (1) after conducting reverse recovery pulse current $I_{OLP}$. The steady reverse base current is limited by the internal base-emitter resistor $R_{BE}$ of the transistor module.

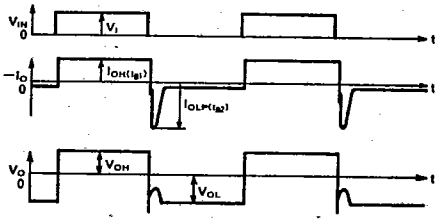
**Advice on PCB Pattern Layout**

1. The auxillary resistor $R_{ext}$ and $R_1$ dissipate a large amount of power. Care should be taken not to heat M57215L, M57215BL by radiant heat from these hot devices.
2. The capacitor $C_{ext}$ should be arranged close to pin 3 and pin 4 to avoid false operation, which may be induced by abrupt change of the load impedance.

**M57215L, M57215BL Typical Application Circuit**




**M57215L, M57215BL Typical Operating Waveform**




Note: $I_{OH}$ and $I_{OLP}$ correspond to base forward current $I_{B1}$ and base reverse current $I_{B2}$ of the transistor module to be driven respectively.